

Cells Worksheet

1. Why is the nucleolus essential to an animal cell?
 - Without it, no ribosomes would be made and the cell would not be able to make proteins. The cell would not be able to carry regular cell activities
2. Give 2 functions of the nucleus.
 - Contains the chromosomes
 - Contains the nucleolus
3. A red blood cell has no nucleus, and has a life expectancy of approximately 120 days. Explain how these two events might be connected.
 - The nucleus contains chromosomes which provide instructions for the production of proteins. Proteins such as hemoglobin (in RBC's) have a lifespan and the cell cannot produce more without the instructions. The cell becomes useless and is therefore recycled by the liver.
4. What is the difference between smooth ER and rough ER?
 - Smooth ER has no ribosomes on the outside, whereas rough ER does. Smooth ER is the site of lipid synthesis and drug detoxification whereas rough ER is the site of protein packaging and transportation.
5. Where is smooth ER located in the cell?
 - Usually away from the nucleus and closer to the cell membrane unlike the rough ER is usually surrounding the nucleus. If there is no rough ER then the smooth ER may be found closer to the nucleus.
6. Why do the cells of the testes and liver have large amounts of smooth ER?
 - The cells of the testes are making testosterone which is a lipid, therefore the organelle for lipid synthesis (SER) must be present.
 - The cells of the liver are detoxifying the blood and therefore need SER for drug detox.
7. What is the functional difference between attached and unattached ribosomes?

- Attached ribosomes are making proteins that will be exported or used in lysosomes
 - Unattached ribosomes are making proteins that will be used within the cell.
8. Describe the structure of polysomes (aka: polyribosomes) and their role in the cell.
 - A polyribosome is when many ribosomes are lined up along a single mRNA (see protein synthesis) making the same protein.
 9. Describe the physical appearance and function of the golgi apparatus
 10. The golgi appears as a stack of flattened sacs with vesicles "blebbing" or "pinching" off the ends of the sacs. It's function is to package proteins for export OR package proteins for use in lysosomes.
 11. What do vacuoles and vesicles contain?
 - Vacuoles and lysosomes are examples of vesicles. Vesicles that are neither a vacuole nor a lysosome are a for the purpose of transporting compounds (usually proteins) through the cell. Vesicles are what are formed when a cell undergoes endocytosis.
 12. What do lysosomes contain and why are they often referred to as suicide sacs?
 - Lysosomes contain hydrolytic enzymes and are often used to digest old cell parts (autodigestion) and are therefore "eating" the cell from the inside out.
 13. What is the main function of the mitochondria?
 - To produce ATP from glucose through cellular respiration.
 14. Sketch a mitochondrion and label the cristae and matrix.
 - See text on page 57
 15. Describe the structure and function of microfilaments.
 - They are made of strands of proteins that form a lattice throughout the cell.
 16. Explain how microtubules and microfilaments manipulate cell shape.
 - They form a lattice and anchor to peripheral proteins on the inner surface of the cell membrane. Shortening of certain microfilaments can create folds or variations in the shape of the cell membrane. They also attach to organelles to hold them in place.

17. Explain how cilia differ from flagella.

- Cilia are short hair like structures that usually move in a wave-like pattern to cause movement of the surrounding medium, whereas a flagellum is a long whip-like structure that moves in a rotational/spiral fashion that causes movement of the surrounding medium and therefore the cell if it is not attached to anything.

18. Why do phospholipid molecules align themselves with the tails inward?

- The tails are the hydrophobic regions of the molecules and since cells are in water, they gather together to minimize their exposure to water. The same reason oil forms droplets on the surface of water.

19. Differentiate between a prokaryotic and a eukaryotic cell.

- Prokaryotic is a cell without membrane bound organelles (not even a nucleus, it is bacterial), whereas a eukaryotic cell is one with membrane bound organelles (one of which is a prominent nucleus).

20. Describe three cellular processes which make use of vesicles. (3 marks)

- Autolysis / enzymes from lysosomes break down worn-out cell parts or entire cells.
- Intracellular digestion.
- Viruses are packaged in vesicles.
- Neurotransmitters are packaged in vesicles.
- Cell products produced at the rough endoplasmic reticulum are packaged into vesicles at the smooth endoplasmic reticulum.
- Vesicles carrying cell products fuse with the Golgi bodies releasing their contents for storage and modification.
- Vesicles pinch off from the Golgi bodies and transport material to the cell membrane.
- The cell membrane folds inwards forming vesicles during the process of pinocytosis.
- In exocytosis, vesicles allow cell materials (e.g., wastes, hormones) to be exported from the cell.
- In phagocytosis, entire cells or cell fragments are brought into large vesicles.

- Lysosomes pinch off from the Golgi bodies and are used in intracellular digestion.
- Storage of macromolecules such as glycogen in liver cells and starch in plants cells.

21. Describe how the function of the cell membrane, vacuoles and lysosomes are related.(3 marks)

- The cell membrane folds in to produce a vacuole.
- The vacuole contains food or large particles.
- The lysosome binds to the vacuole.
- Hydrolytic enzymes in the lysosome break down the molecules within the vacuole.

[any three for 1 mark each]

22. Name an organ whose cells contain large amounts of smooth endoplasmic reticulum. (1 mark).

- liver
- testes
- ovaries
- adrenal gland

23. Describe how the RER, the Golgi, vesicles, and the cell membrane work together. (4 marks)

- Smooth endoplasmic reticulum synthesizes lipids.
- Ribosomes on the rough endoplasmic reticulum (W) produce proteins.
- Proteins enter the lumen of the rough endoplasmic reticulum (W).
- Proteins pinch off the rough endoplasmic reticulum in vesicles. OR Proteins travel to the smooth endoplasmic reticulum and are carried off in transport vesicles.
- Golgi bodies (X) store the proteins.
- There is modification of proteins at the Golgi bodies.
- Golgi bodies package proteins into (secretory) vesicles.
- Vesicles (Y) carry cell products from the Golgi to the cell membrane (Z).
- Vesicles attach to the cell membrane and products are released through

exocytosis. OR Protein is released via
exocytosis. OR Vesicles fuse with cell
membrane and then releases their
contents out of the cell.